

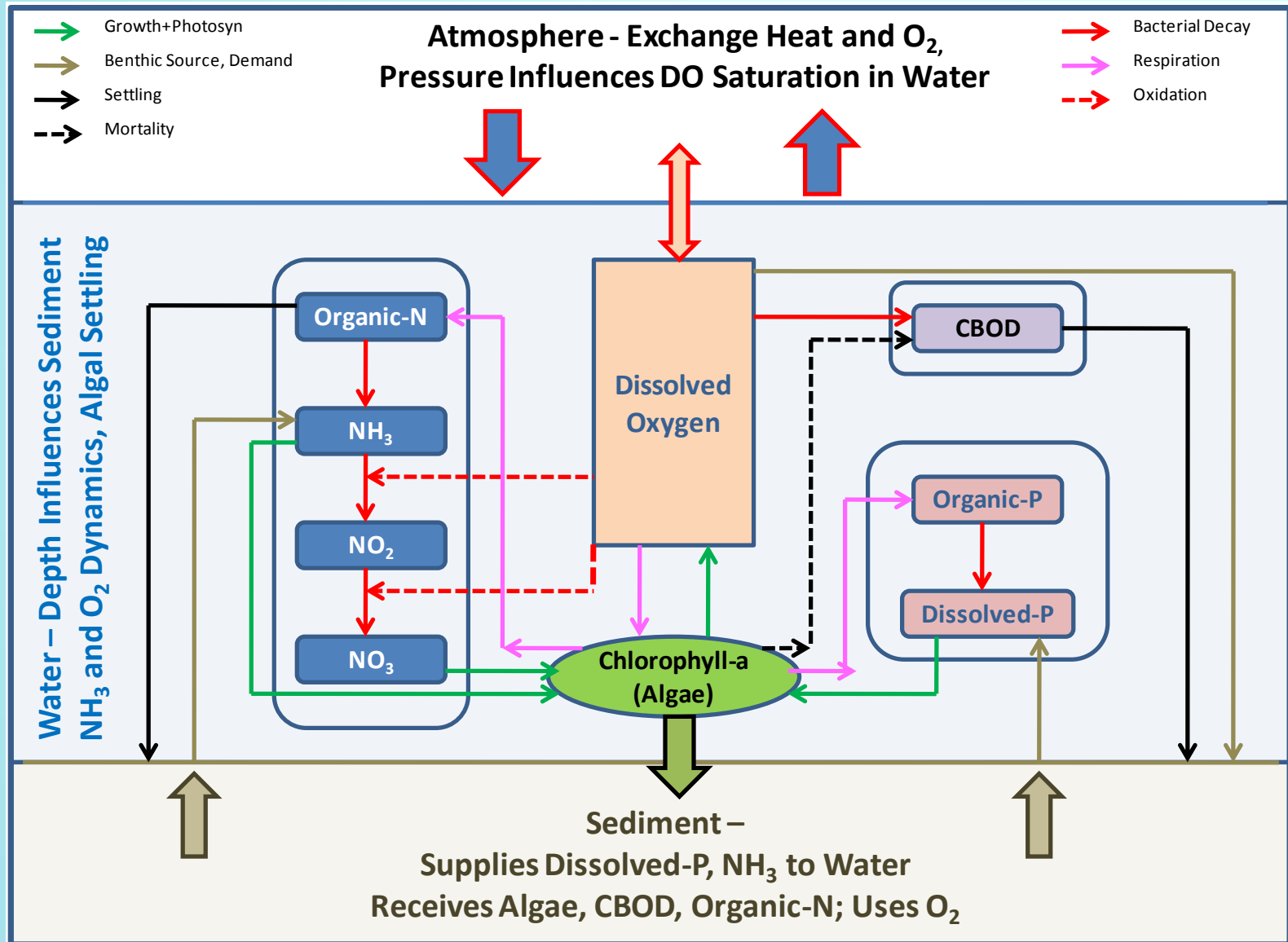
DSM2 and WARMF: QUAL Model with Different Nutrient BC Compared

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Resource Management Associates



Background

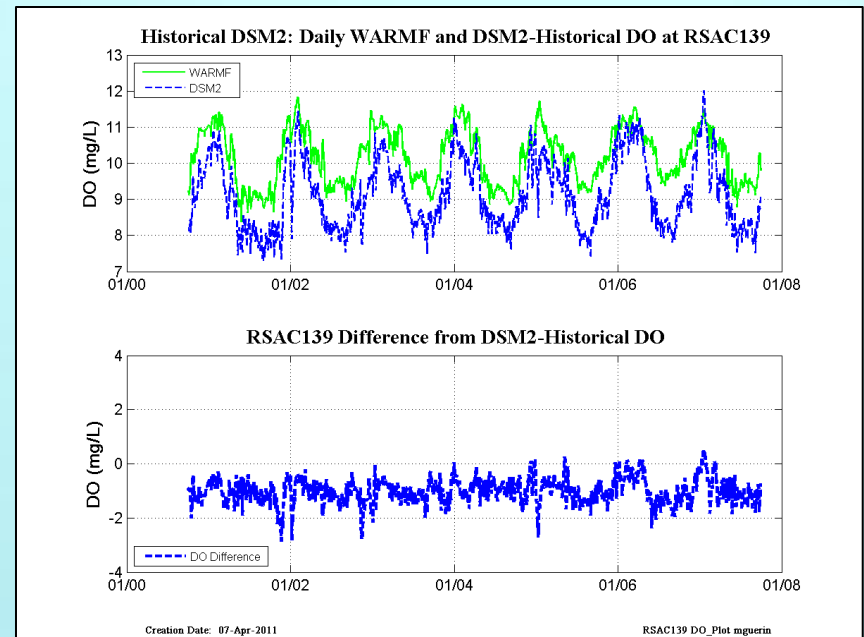
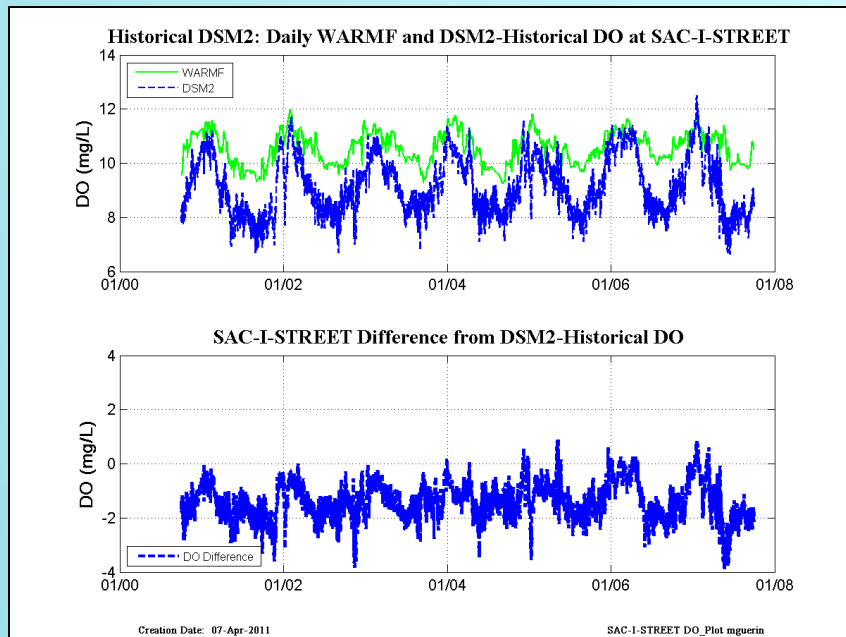
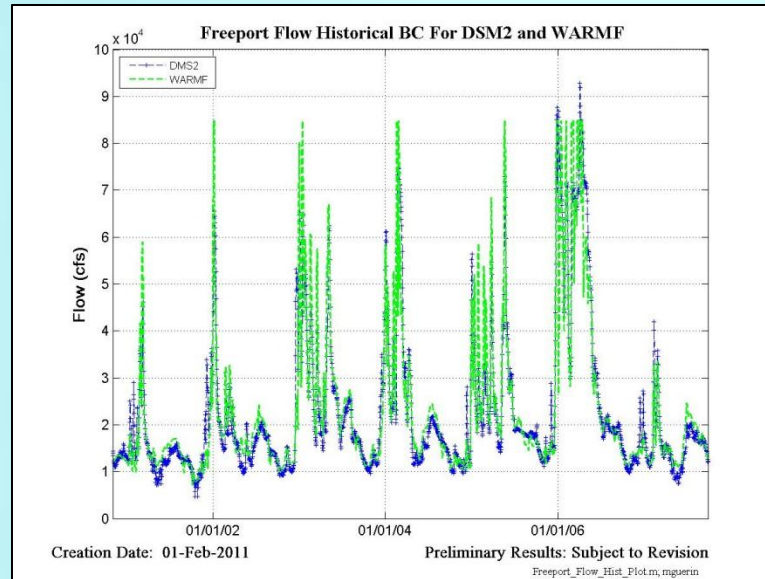
- ▶ The models
 - WARMF (Systech), DSM2
- ▶ WARMF –
 - Watershed model, simulates saturated and unsaturated flow and chemical reactions (nutrients)
 - output generated at DSM2 boundaries
 - Daily time step calculations produces unusual results for Algae, DO
- ▶ Questions to answer –
 - Can I use the WARMF-generated BC directly in DSM2 nutrient model?
 - What are the downstream consequences?



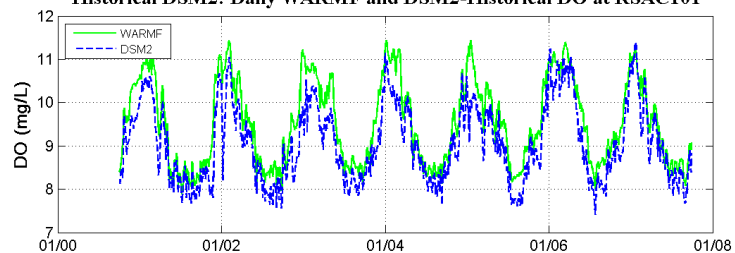
Historical QUAL Nutrient BC

- ▶ Vernalis–
 - Data – from Vernalis
 - Organic_P, CBOD, NO₂– All synthetic
- ▶ Freeport –
 - Data – mostly from Greens Landing/Hood
 - NH₃, Organic_P, CBOD, NO₂– All synthetic
- ▶ Mokelumne, Calaveras, Cosumnes, Yolo –
 - Almost all data is synthetic – small amount of real data from R. Dahlgren (UC Davis) at Mokelumne and Cosumnes Rivers

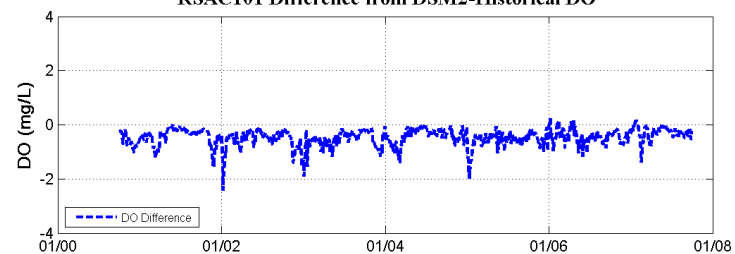
Freeport – DO



Historical DSM2: Daily WARMF and DSM2-Historical DO at RSAC101



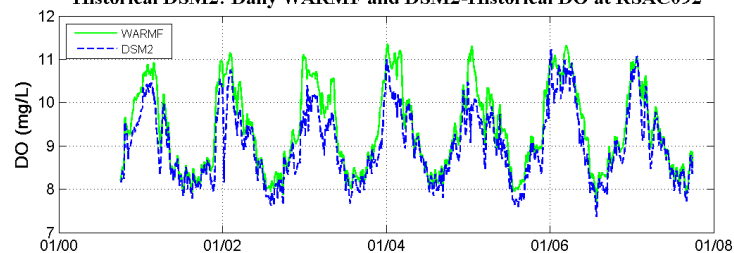
RSAC101 Difference from DSM2-Historical DO



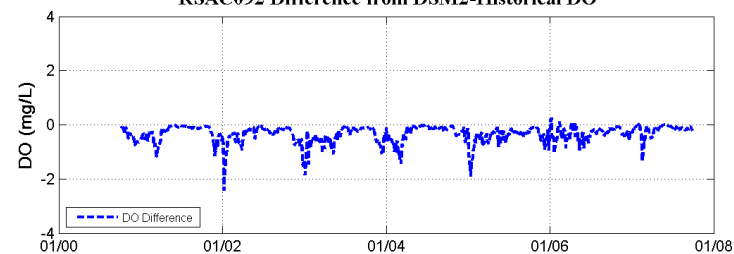
Creation Date: 07-Apr-2011

RSAC101 DO_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical DO at RSAC092



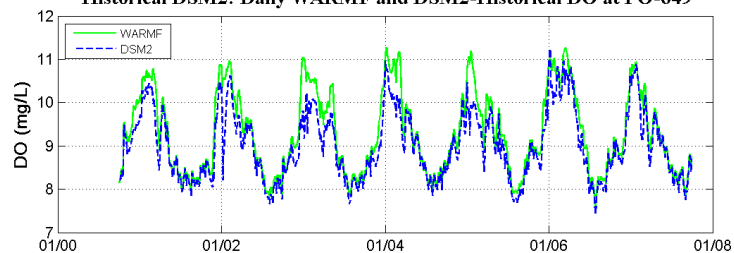
RSAC092 Difference from DSM2-Historical DO



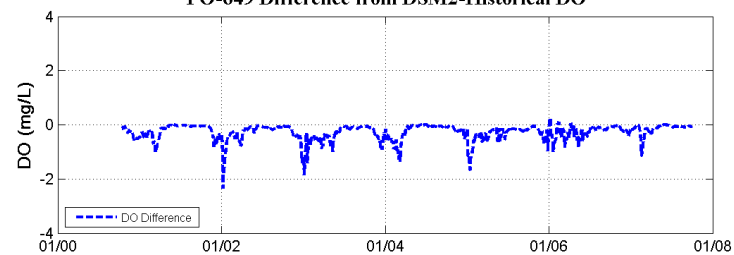
Creation Date: 07-Apr-2011

RSAC092 DO_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical DO at PO-649



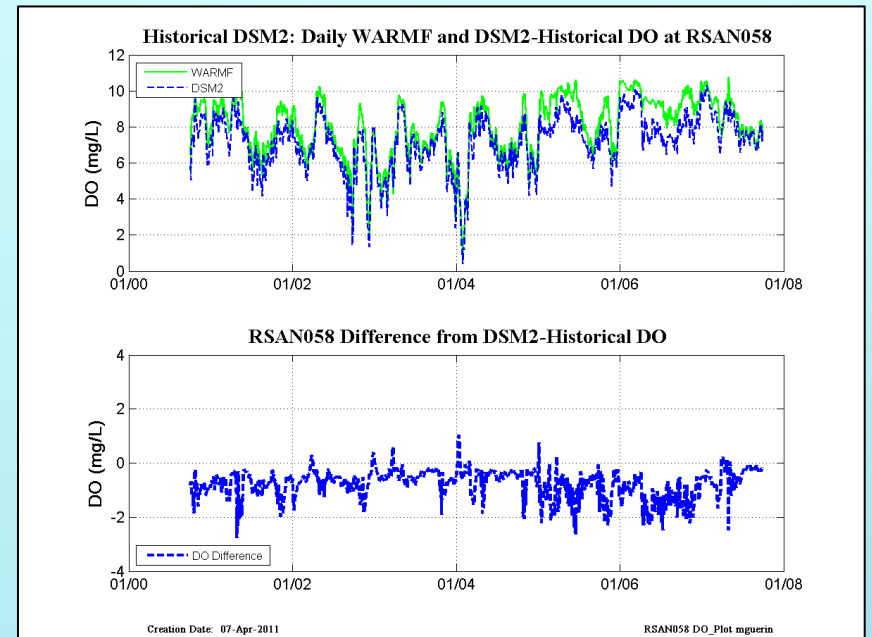
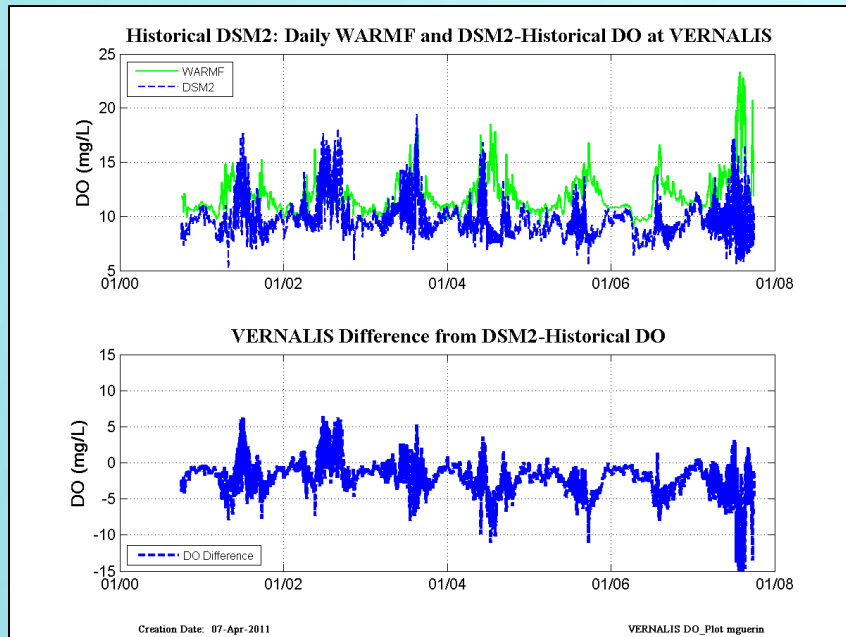
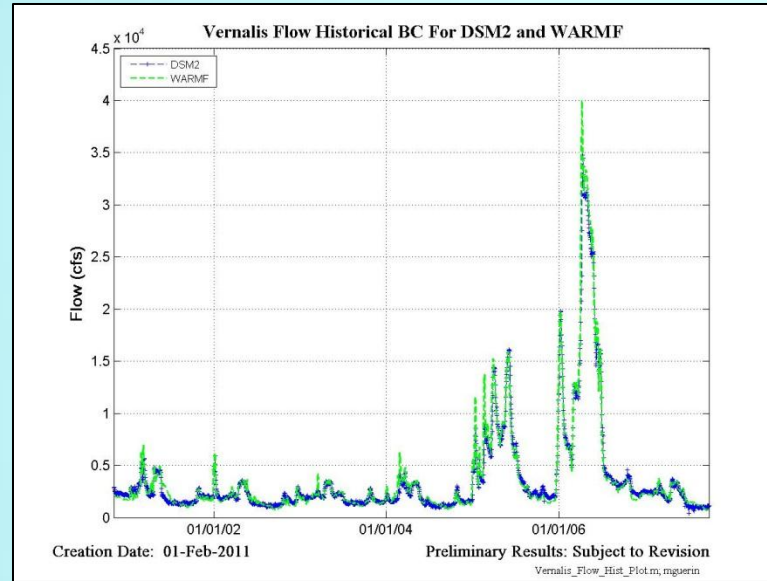
PO-649 Difference from DSM2-Historical DO

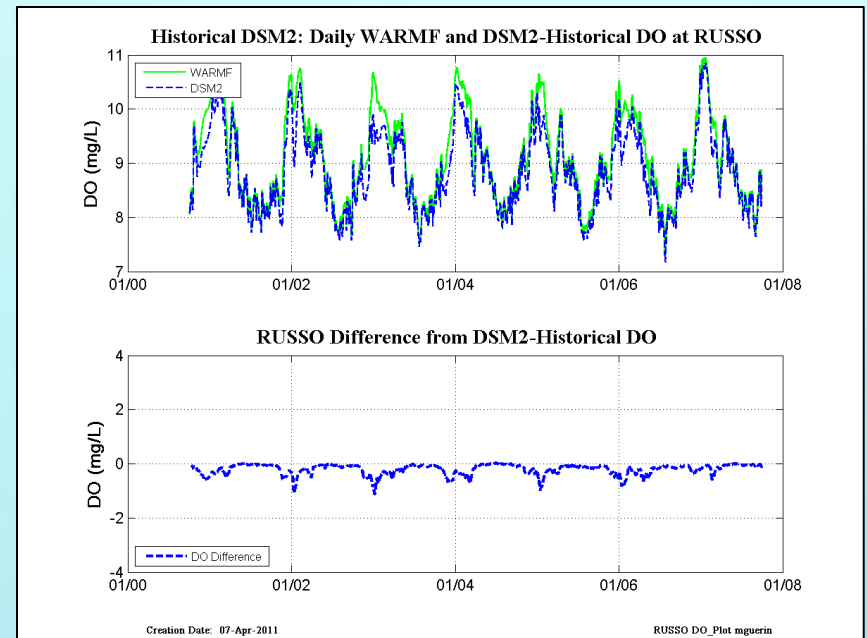
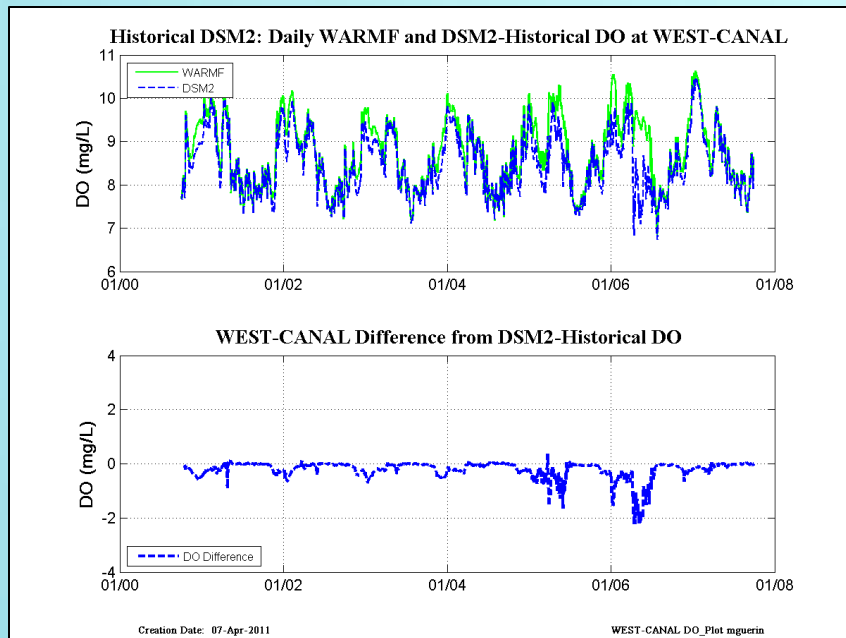
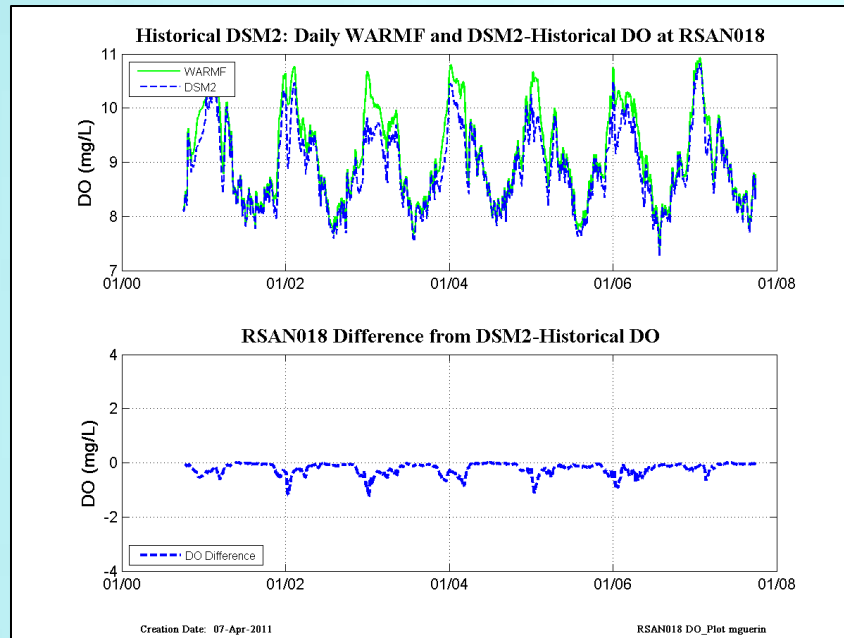


Creation Date: 07-Apr-2011

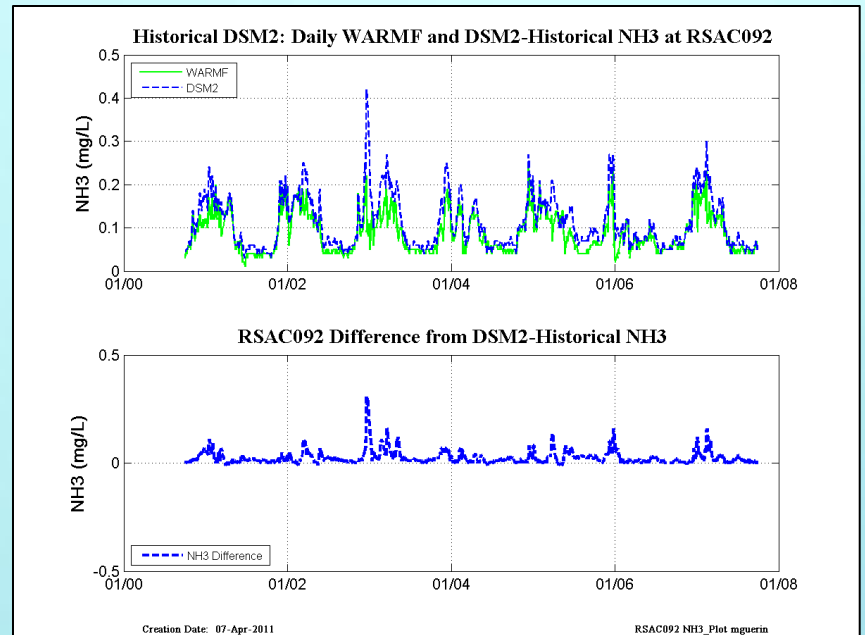
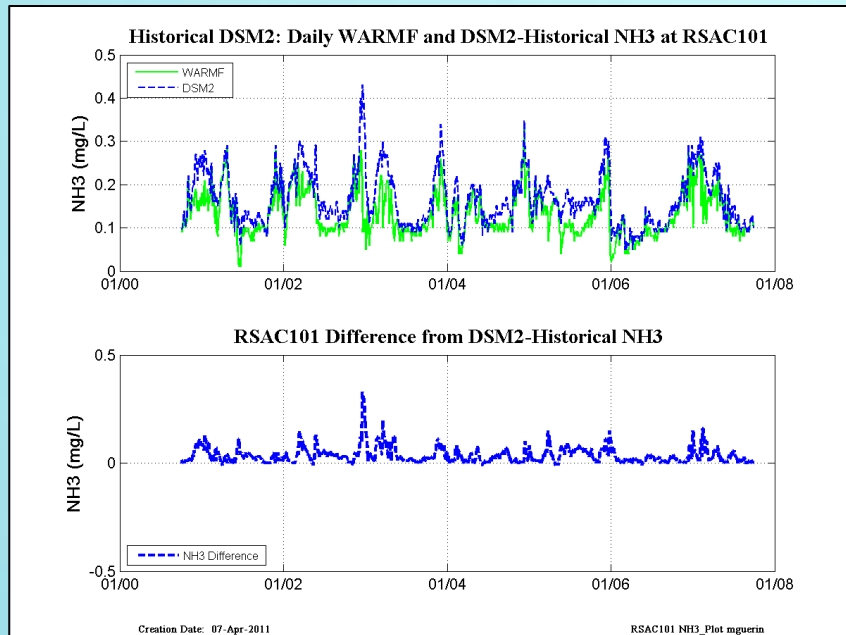
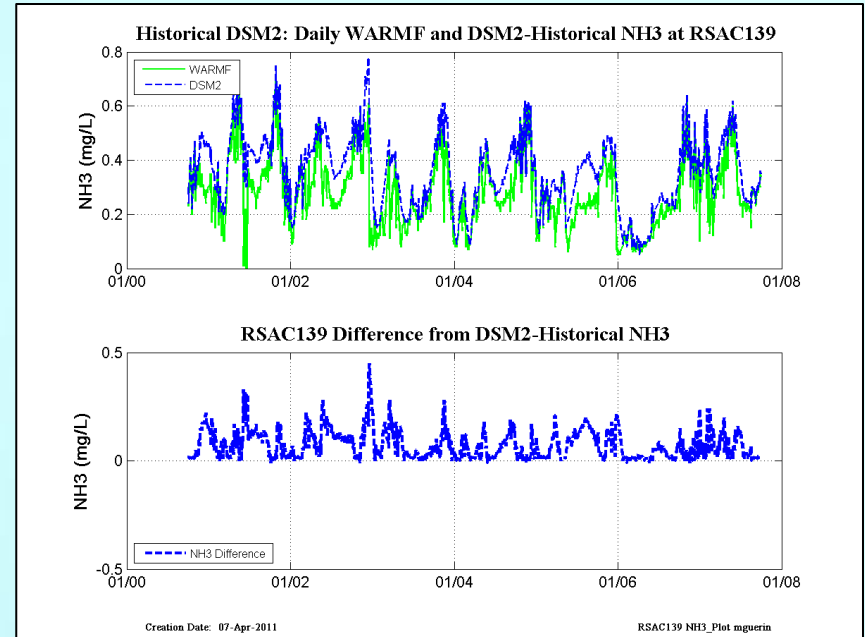
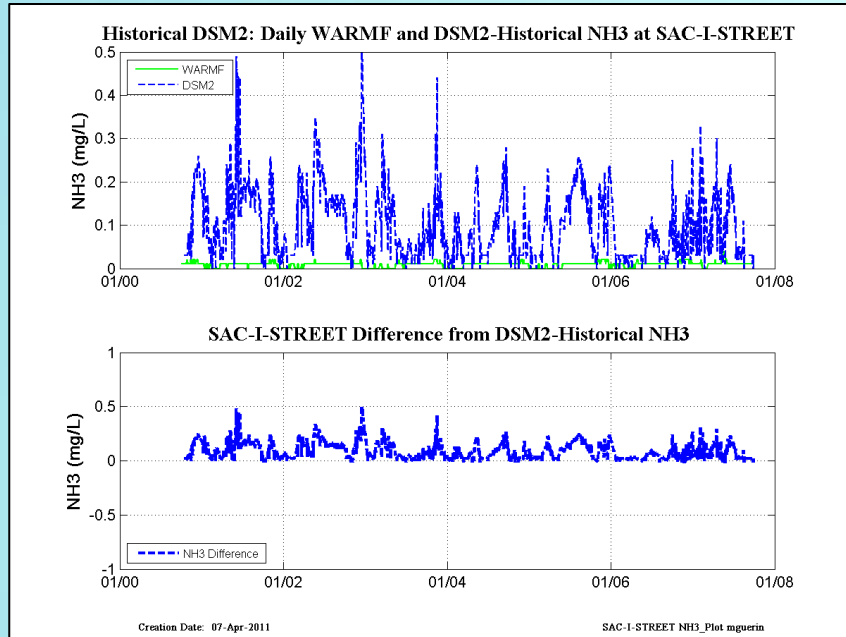
PO-649 DO_Plot mguerin

Vernalis – DO

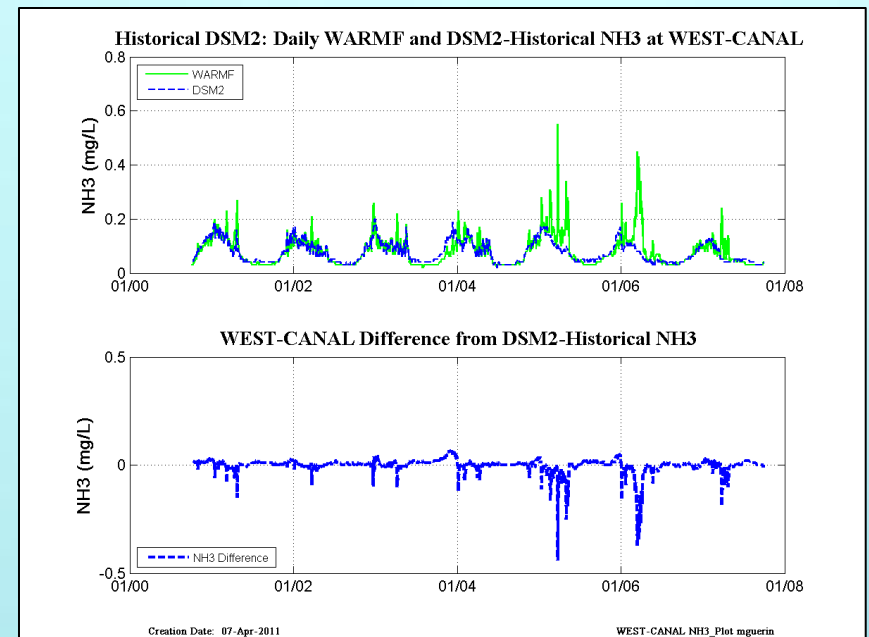
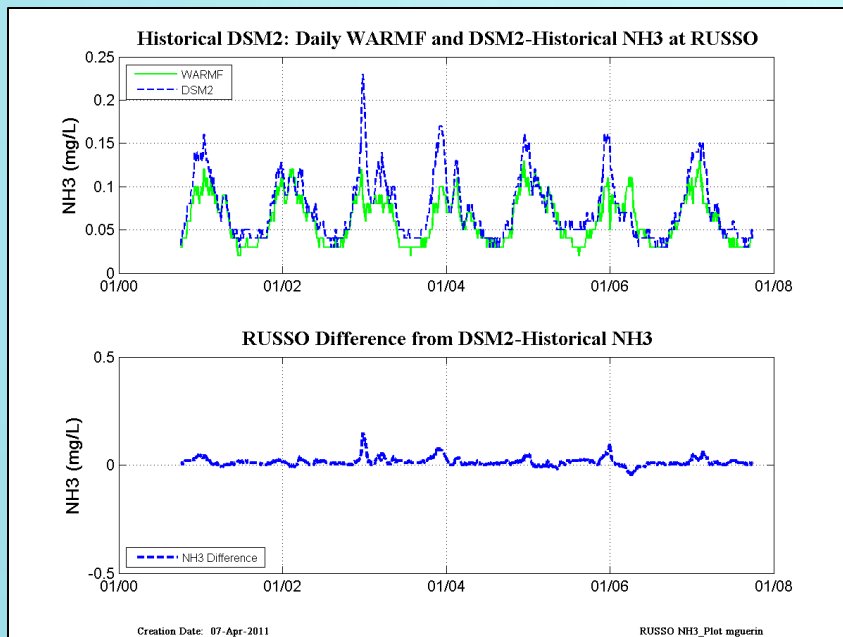
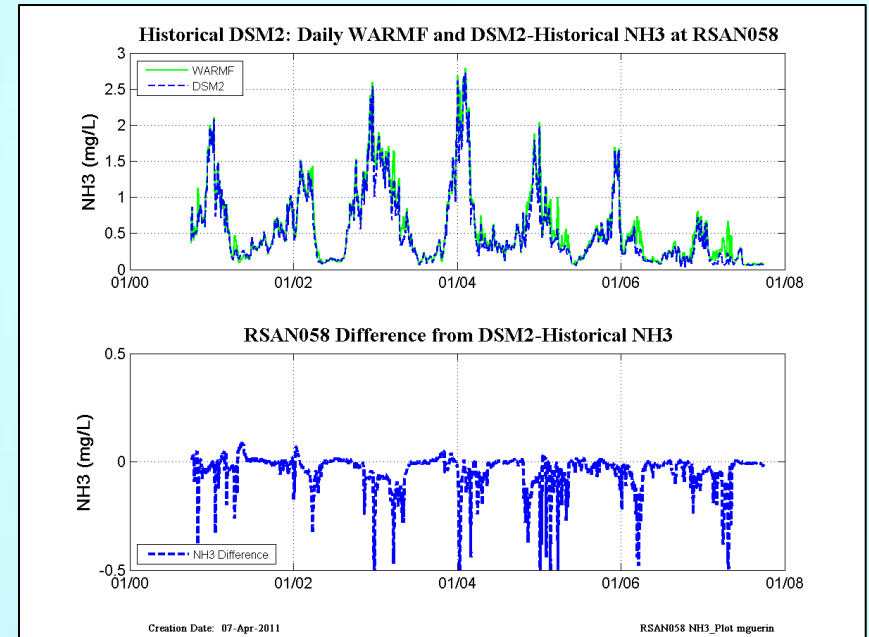
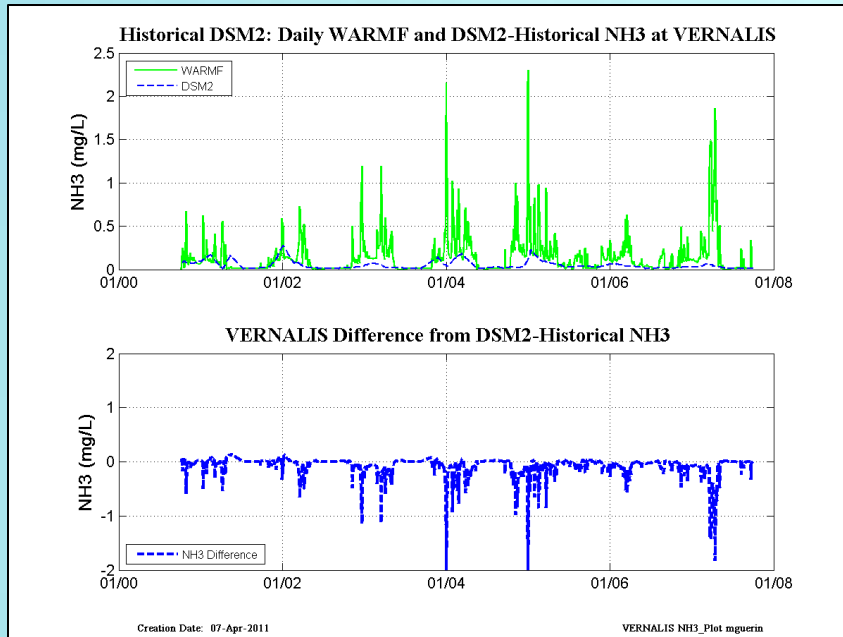




Freeport – Ammonia

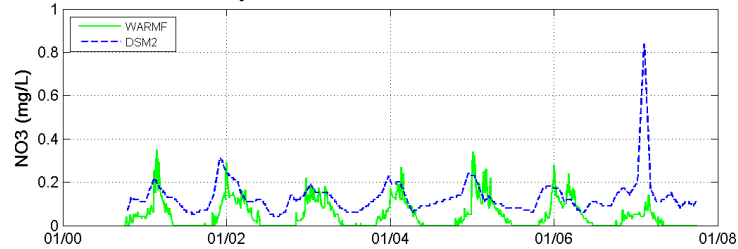


Vernalis – Ammonia

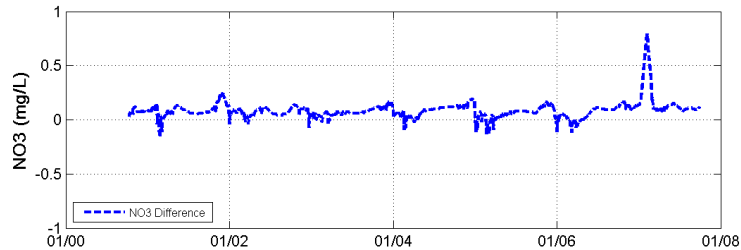


Freeport – Nitrate

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at SAC-I-STREET



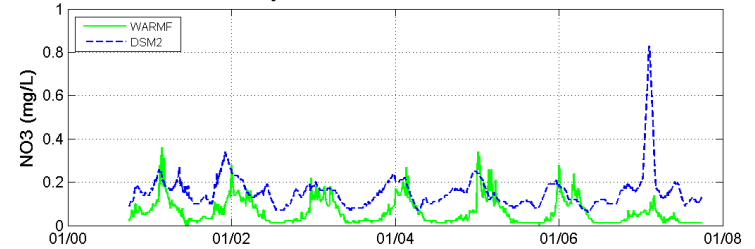
SAC-I-STREET Difference from DSM2-Historical NO3



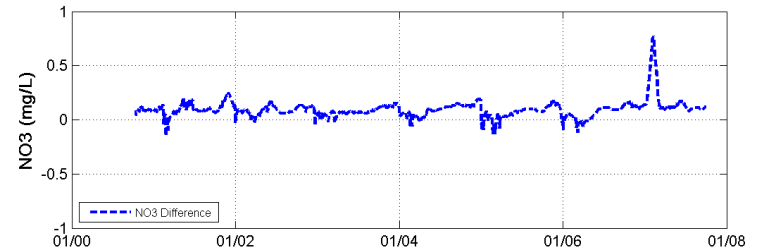
Creation Date: 07-Apr-2011

SAC-I-STREET NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at RSAC139



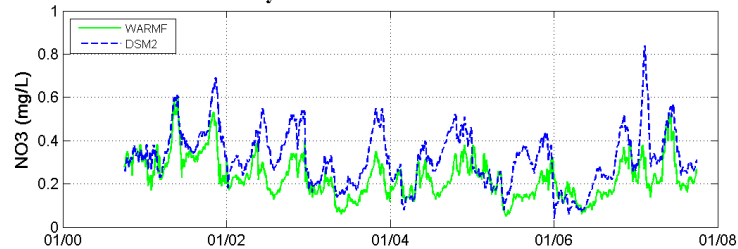
RSAC139 Difference from DSM2-Historical NO3



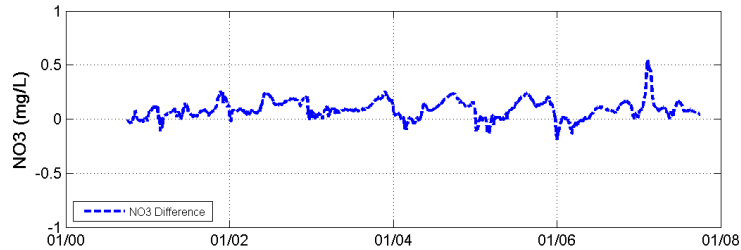
Creation Date: 07-Apr-2011

RSAC139 NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at RSAC101



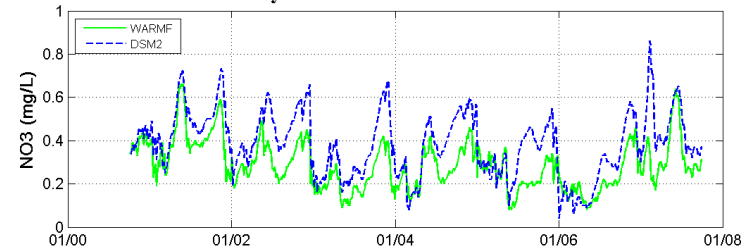
RSAC101 Difference from DSM2-Historical NO3



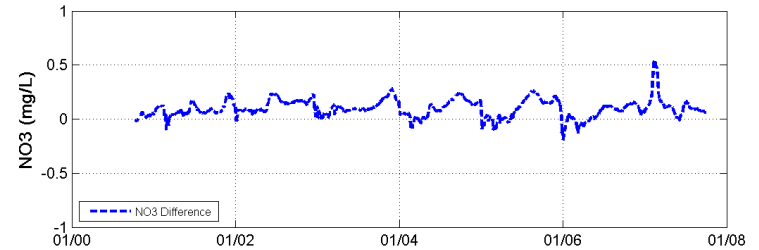
Creation Date: 07-Apr-2011

RSAC101 NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at RSAC092



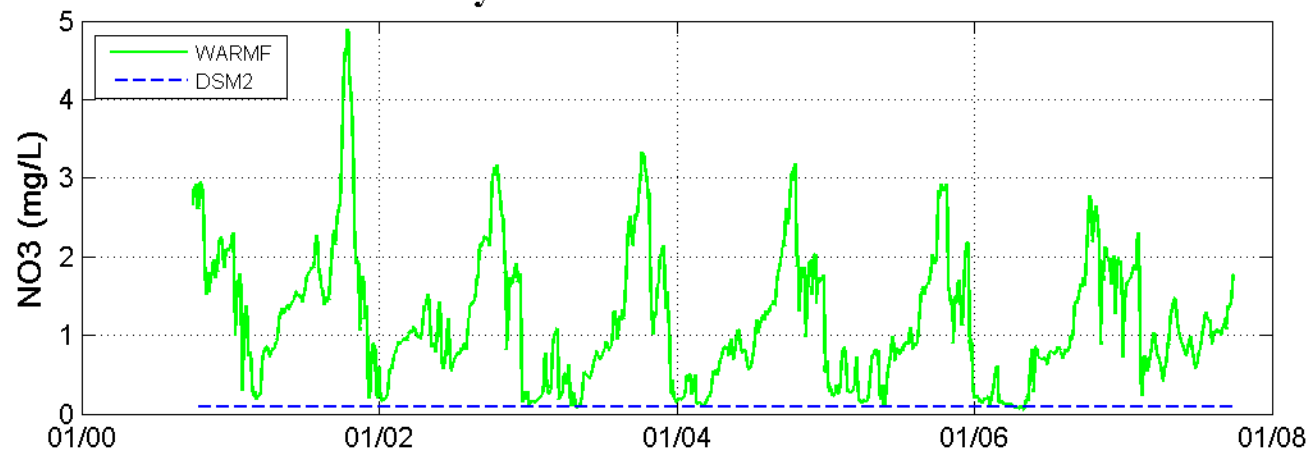
RSAC092 Difference from DSM2-Historical NO3



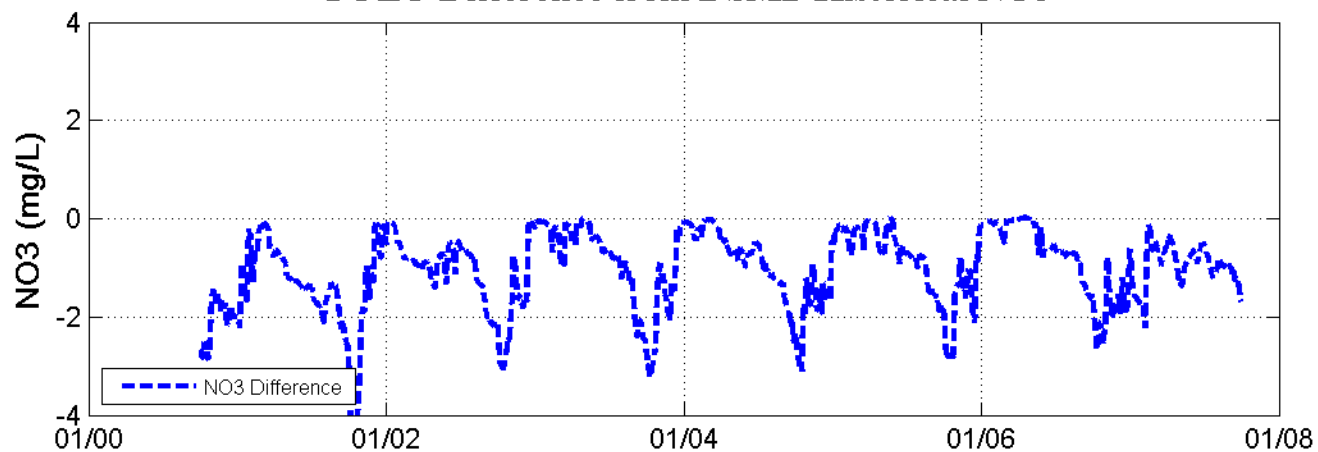
Creation Date: 07-Apr-2011

RSAC092 NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at YOLO

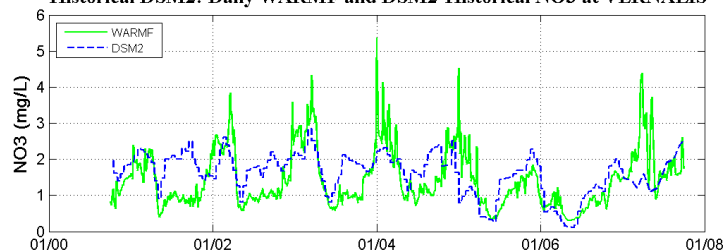


YOLO Difference from DSM2-Historical NO3

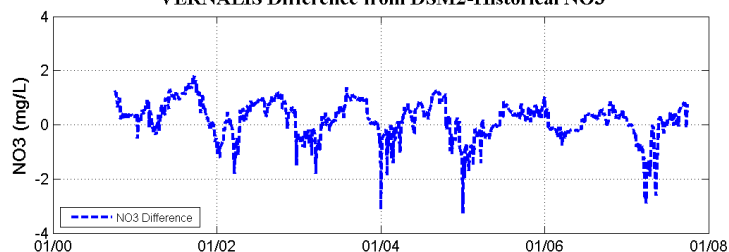


Vernalis – Nitrate

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at VERNALIS



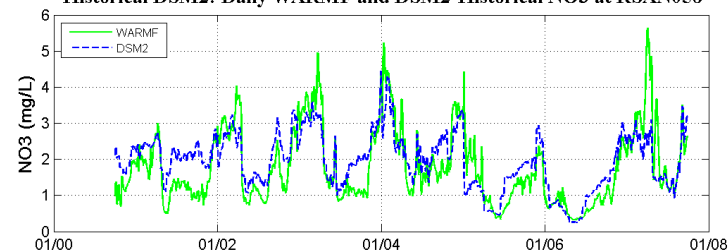
VERNALIS Difference from DSM2-Historical NO3



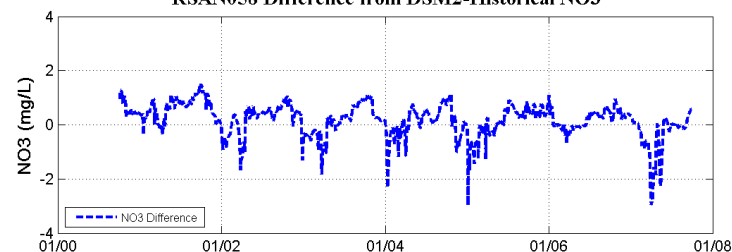
Creation Date: 07-Apr-2011

VERNALIS NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at RSAN058



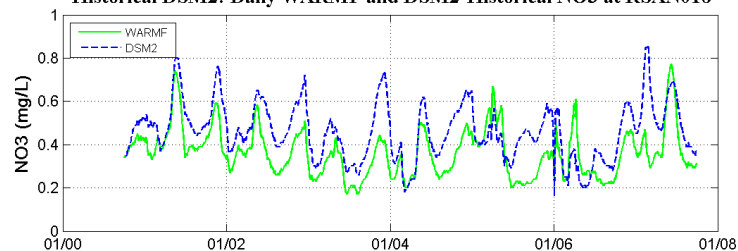
RSAN058 Difference from DSM2-Historical NO3



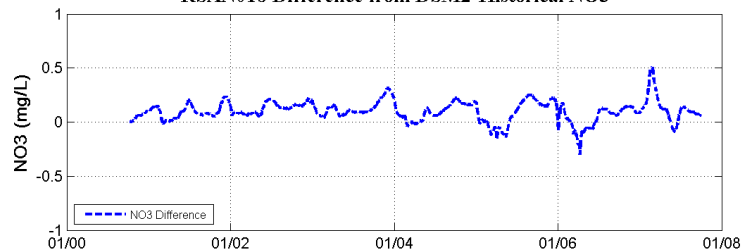
Creation Date: 07-Apr-2011

RSAN058 NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at RSAN018



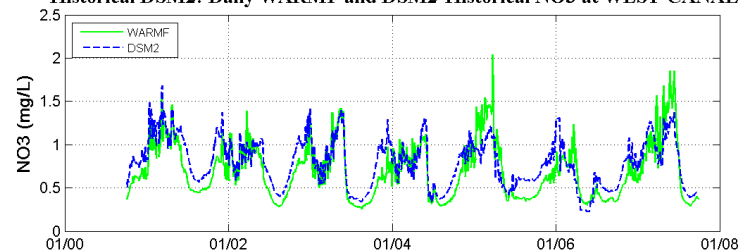
RSAN018 Difference from DSM2-Historical NO3



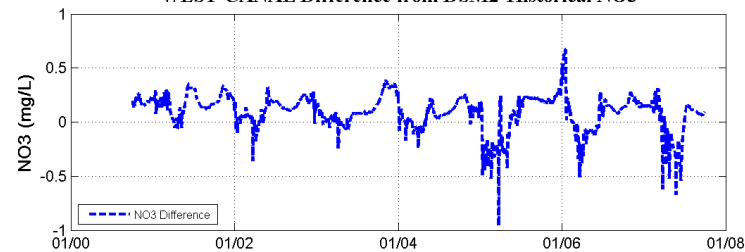
Creation Date: 07-Apr-2011

RSAN018 NO3_Plot mguerin

Historical DSM2: Daily WARMF and DSM2-Historical NO3 at WEST-CANAL



WEST-CANAL Difference from DSM2-Historical NO3



Creation Date: 07-Apr-2011

WEST-CANAL NO3_Plot mguerin

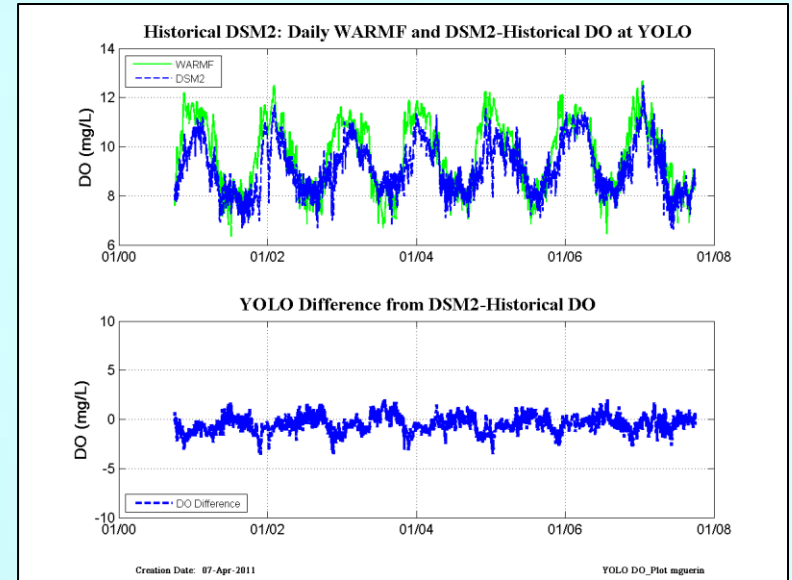
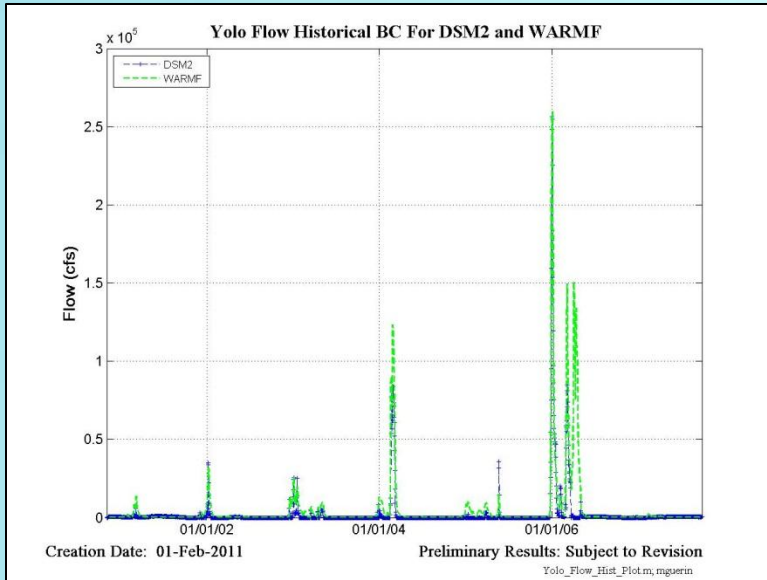
Answers to Questions:

- ▶ Can I use the WARMF-generated BC directly in DSM2 nutrient model?
 - Answer – A qualified Yes.
 - Some constituents (NO_3 , NH_3) need BC tuning in both models (different for each model)
- ▶ What are the downstream consequences?
 - Many BC differences diminish by the time they reach the S. Delta –combination of mixing and reaction chemistry
- ▶ DSM2 nutrient model is ‘robust’ – *i.e.*:
 - Despite large differences in boundary conditions, most nutrient concentration differences diminish ‘shortly’ downstream of the boundaries

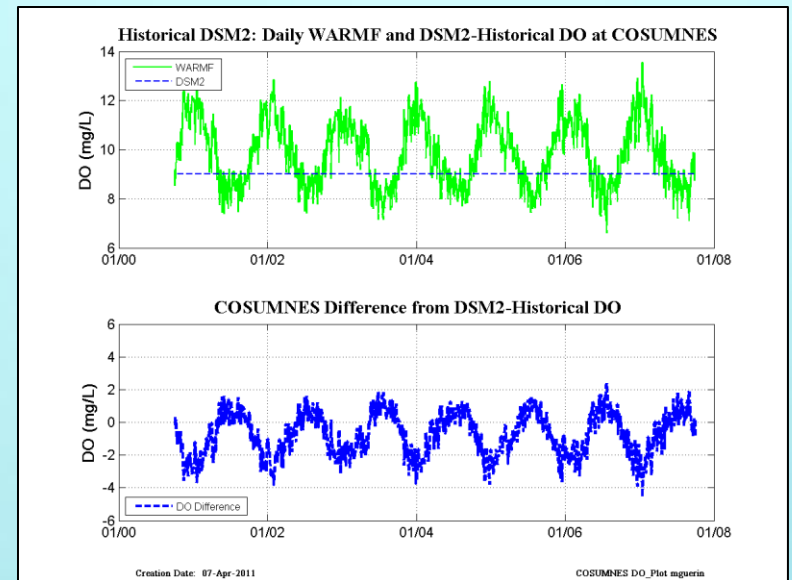
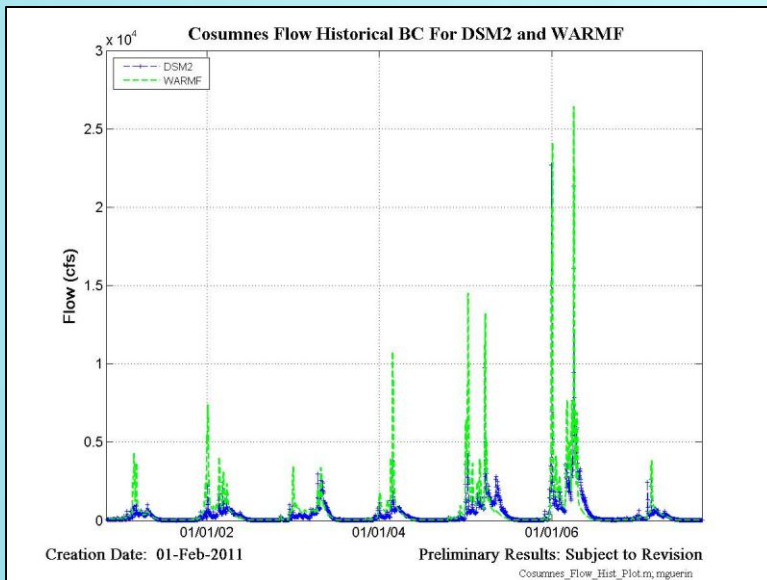
Thank-you.

Questions?

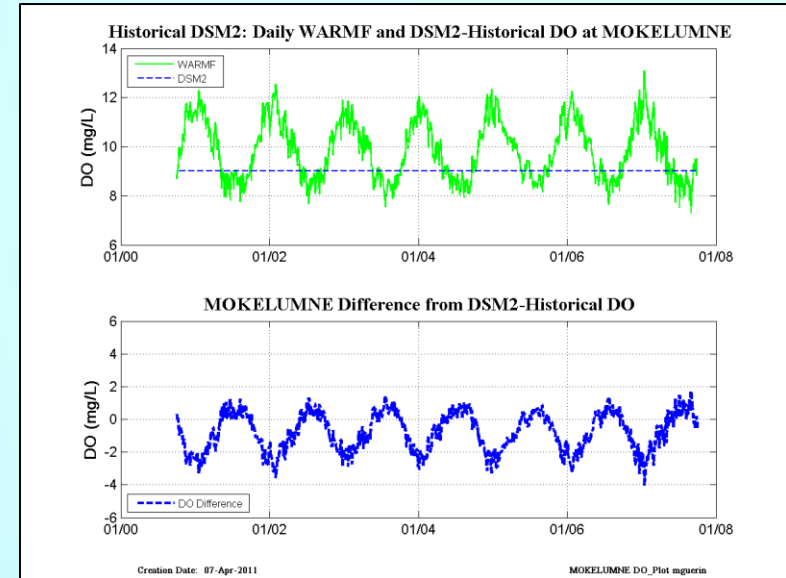
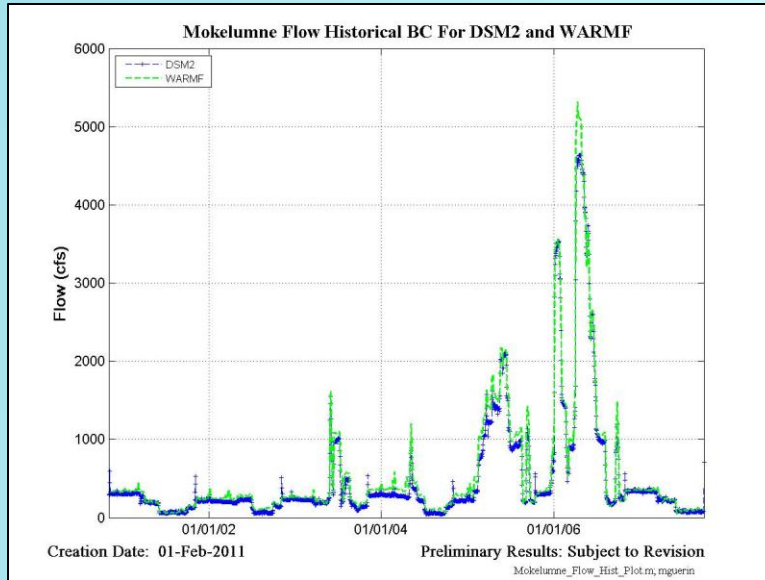
Yolo



Cosumnes



Mokelumne



Calaveras

